(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 March 2002 (21.03.2002)

PCT

(10) International Publication Number
WO 02/22101 A1

(51) International Patent Classification[7]: A61K 7/48, 7/06, C11D 1/00

(21) International Application Number: PCT/US00/25084

(22) International Filing Date:
13 September 2000 (13.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **THE PROCTER & GAMBLE COMPANY** [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **O'PREY, Conor, James** [GB/GB]; Top Flat, 21 Sheen Park, Richmond, Surrey TW9 1UN (GB). **TRANI, Marina** [IT/GB]; 95 Victoria Road, Ascot, Berkshire SL5 9DR (GB). **WEISGERBER, David, John** [US/US]; 2632 Fairhill Drive, Cincinnati, OH 45239 (US).

(74) Agents: **REED, T., David** et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 02/22101 A1

(54) Title: COSMETIC METHOD

(57) Abstract: According to the present invention there is provided a cosmetic method for providing improved skin hydration wherein the method comprises topically applying to the skin a protease enzyme, and simultaneously or sequentially, topically applying to the skin a polyhydric alcohol. There is also provided a cosmetic method for providing improved skin hydration wherein the method comprises topically applying to the skin a polyhydric alcohol, and simultaneously or sequentially, topically applying to the skin a protease enzyme. Furthermore there is provided a cosmetic method for providing improved skin hydration wherein the method comprises topically applying to the skin a cosmetic composition comprising: a) from about 0.0001 % to about 1 %, by weight, of protease enzyme; and b) from about 0.1 % to about 20 %, by weight, of polyhydric alcohol. Finally there is provided a cosmetic method for providing improved skin hydration comprising topically applying to the skin a first cosmetic composition comprising from about 0.0001 % to about 1 %, by weight, of protease enzyme, and either simultaneously or sequentially applying to the skin a second cosmetic composition comprising from about 0.1 % to about 20 %, by weight, of polyhydric alcohol.

Cosmetic Method

Technical Field

The present invention relates to the use of cosmetic compositions comprising a protease enzyme and a polyhydric alcohol for improving skin hydration, skin softness and skin smoothness.

Background of the Invention

Skin is made up of several layers of cells which coat and protect the keratin and collagen fibrous proteins that form the skeleton of its structure. The outermost of these layers, referred to as the stratum corneum, is known to be composed of 25nm protein bundles surrounded by 8nm thick layers. Anionic surfactants and organic solvents typically penetrate the stratum corneum membrane and, by delipidization (i.e. removal of the lipids from the stratum corneum), destroy its integrity. This destruction of the skin surface topography leads to a rough feel and may eventually permit the surfactant or solvent to interact with the keratin, creating irritation.

Dry, itchy or flaky skin may also result from the failure to maintain a proper water gradient across the stratum corneum. Most of the water needed to maintain the water gradient, which is sometimes considered to be the stratum corneum's plasticizer, comes

from inside the body. If the humidity is too low, such as in a cold climate, insufficient water remains in the outer layers of the stratum corneum to properly plasticize the tissue, and the skin begins to scale and becomes itchy.

The use of protease enzymes in cosmetic compositions to provide a skin care benefit is known. It is believed that protease enzymes function primarily by providing a desquamatory action to the cosmetic composition. It is believed that the proteases remove damaged (e.g. dry) skin cells on the surface of the skin, thereby reducing the rough feel associated therewith. The protease removes the effect of prior damage to the skin, giving the skin a fresher, more youthful appearance and feel.

Disclosures describing cosmetic compositions comprising protease enzymes have to date focussed on stabilising the enzyme within the composition. These disclosures include encapsulating the enzymes prior to inclusion within the cosmetic composition (GB 1,255,284 and JP 10-251122); buffering the cosmetic composition such that the enzyme remains inactive until used (WO 97/47238); and using precursors or other actives within the composition to stabilise the enzyme (EP 0710478 and SU 1690764). However the favoured approach in the art for stabilising protease enzymes in cosmetic compositions is to dramatically reduce water availability within the composition by formulating the aqueous phase of any composition with very high levels of polyhydric alcohol such as glycerine, disclosed in JP 1283213, JP 3294211. Unfortunately such systems have unacceptable aesthetics for cosmetic products. This has been overcome to date by formulation of the aqueous phase into a water in oil emulsion (US 5,932,234 and US 5,830,449) or into a triple water in oil in water emulsion (EP 0779071). A further solution has been to store the product within two different chambers within a single pack wherein the first chamber contians the stabilised enzyme in high levels of polyhydric alcohol and the second chamber contains an aqueous cosmetic composition such that when the two phases are dispensed and mixed the final aqueous composition has acceptable aesthetics (WO 97/27841). Whilst the prior art provides useful advances in stabilising enzymes, particularly protease enzymes, within a range of cosmetic compositions it does not sufficiently teach use of cosmetic compositions comprising a

protcase enzyme and a polyhydric alcohol for improving skin hydration, skin softness and skin smoothness.

It is also known to use polyhydric alcohols such as glycerine in cosmetic compositions for providing skin moisturisation benefits. Despite this, there is a still a desire to provide further improvements in skin moisturisation (hydration), skin softness and skin smoothness. It has now surprisingly been found that by applying to the skin a protease enzyme and, simultaneously or sequentially applying to the skin a polyhydric alcohol, a significant improvement can be seen in skin moisturisation (as measured by improved skin hydration), as well as in skin softness and skin smoothness above that which would be expected from the use of polyhydric alcohol alone. Without wishing to be bound by theory it is believed that the desquamation effect of the protease enzyme removes the dead top layers of skin revealing healthy under layers which are better able to be hydrated by the polyhydric alcohol.

Summary of the Invention

According to the first aspect of the present invention there is provided a cosmetic method for providing improved skin hydration wherein the method comprises topically applying to the skin a protease enzyme, and simultaneously or sequentially, topically applying to the skin a polyhydric alcohol.

According to a second aspect of the present invention there is provided a cosmetic method for providing improved skin hydration wherein the method comprises topically applying to the skin a polyhydric alcohol, and simultaneously or sequentially, topically applying to the skin a protease enzyme.

According to a third aspect of the present invention there is provided a cosmetic method for providing improved skin hydration wherein the method comprises topically applying to the skin a cosmetic composition comprising (a) from about 0.0001% to about 1%, by

weight, of protease enzyme; and (b) from about 0.1% to about 20%, by weight, of polyhydric alcohol.

According to a fourth aspect of the present invention there is provided a cosmetic method for providing improved skin hydration comprising topically applying to the skin a first cosmetic composition comprising from about 0.0001% to about 1%, by weight, of protease enzyme, and either simultaneously or sequentially applying to the skin a second cosmetic composition comprising from about 0.1% to about 20%, by weight, of polyhydric alcohol.

The methods of the present invention provide significant improvements in skin hydration, skin softness and skin smoothness benefits.

Detailed Description of the Invention

All percentages and ratios used herein are by weight of the total composition and all measurements made are at 25°C, unless otherwise designated. Unless otherwise indicated all percentages, ratios and levels of ingredients referred to herein are based on the actual amount of the ingredient, and do not include solvent, fillers or other materials which may be combined with the ingredient in commercially available products. Chain length and degrees of ethoxylation are also specified on a weight average basis.

All publications cited herein are hereby incorporated by reference in their entirety, unless otherwise indicated.

The term "enzyme" as used herein means the enzyme, wild-type or variant, either *per se*, or chemically modified by the conjugation of polymer moieties.

The term "protease enzyme" as used herein refers to any enzyme whose substrate is a protein.

As used herein, the term "wild-type" refers to an enzyme produced by unmutated hosts.

As used herein, the term "variant", means an enzyme having an amino acid sequence which differs from that of the wild-type enzyme due to the genetic mutation of the host producing that enzyme.

As used herein "enzyme activity" refers to the activity of 20µl of enzyme solution (50ppm) when reacted with the surface of a suitable proteinaceous substrate disc of diameter 1cm, at room temperature over a 30 minute time period. By adjusting the pH of the enzyme buffer solution, it is possible to compare the effect of pH on enzyme activity. For the enzymes for use herein suitable activity is defined as greater than 20% of reaction complete within 30minutes, preferably greater than 50%, more preferably greater than 75%. By using this measure it is defined that enzyme buffers of less than pH 5.5 are not suitable for use with this enzyme.

The term "skin hydration" as used herein refers to an improvement in skin moisture content which can be determined either by technical measures such as by use of a corneometer etc, or expert visual measures for example Fitzpatrick skin dryness scale or by consumer self assessment.

The "water activity a_w" of a medium containing water is the ratio of the water vapour pressure of the product "P_{H2O} product" to the vapour pressure of pure water "P_{H2O} pure" at the same temperature. It can also be expressed as the ratio of the number of molecules of water "N_{H2O}" to the total number of molecules

"$N_{H2O} + N_{dissolved\ substances}$", which takes account of the molecules of dissolved substances "$N_{dissolved\ substances}$".

It is given by the following formulae:

$$a_w = \frac{P_{H_2O}\ product}{P_{H_2O}} = \frac{N_{H_2O}}{N_{H_2O} + N_{dissolved\ substances}}$$

Various methods can be used for measuring the water activity. The most common is the manometric method, by which the vapour pressure is measured directly.

The elements of these compositions are described in more detail below.

Cosmetic Method

The methods of the present invention comprise applying to the skin a protease enzyme together with a polyhydric alcohol. The protease enzyme and the polyhydric alcohol can be delivered to the skin either simultaneously or sequentially.

Hence, according to one aspect of the present invention there is provided a cosmetic method for providing improved skin hydration comprising topically applying to the skin a protease enzyme and simultaneously or sequentially topically applying to the skin a polyhydric alcohol.

In another aspect of the present invention there is provided a cosmetic method for providing improved skin hydration comprising topically applying to the skin a polyhydric alcohol and simultaneously or sequentially topically applying to the skin a protease enzyme.

It is also possible to deliver the protease enzyme and the polyhydric alcohol to the skin simultaneously from a single cosmetic composition, by which is meant essentially at the same time.

It is also possible to deliver the protease enzyme and the polyhydric alcohol to the skin sequentially for two separate cosmetic compositions. By sequentially it is meant that the two compositions are deliver one after the other, in any order, where the second composition is added within 1 hour of delivery of the first composition. It is preferred that the enzyme composition is applied to the skin first. Furthermore it is preferred that the polyhydric alcohol composition is added before the buffer solution from the enzyme composition has evaporated.

Hence according to another aspect of the present invention there is provided a cosmetic method for providing improved skin hydration comprising topically applying to the skin a cosmetic composition comprising from about 0.0001% to about 1%, preferably from about 0.001% to about 0.5% and most preferably from about 0.005% to about 0.1%, by weight, of protease enzyme and from about 0.1% to about 20%, preferably from about 0.5% to about 18%, more preferably from about 2% to about 15% and even more preferably from about 5% to about 12%, by weight, of polyhydric alcohol.

As an alternative, the polyhydric alcohol and the protease enzyme can be delivered to the skin from separate cosmetic compositions.

Hence according to another aspect of the present invention there is provided a cosmetic method for providing improved skin hydration comprising topically applying to the skin a first cosmetic composition comprising a protease enzyme and simultaneously or sequentially topically applying to the skin a second cosmetic composition comprising polyhydric alcohol.

The compositions herein are suitable for topical application to the skin or hair. In particular, the compositions can be in the form of creams, lotions, gels, and the like. Preferably the cosmetic compositions herein are in the form of an emulsion of one or more oil phases in an aqueous continuous phase.

Protease Enzyme

An essential component used in the methods of the present invention is a protease enzyme.

Protease enzymes are classified under the Enzyme Classification number E.C. 3.4 (Carboxylic Ester Hydrolases) in accordance with the Recommendations (1992) of the International Union of Biochemistry and Molecular Biology (IUBMB). Useful proteases are also described in PCT publications: WO 95/30010 published November 9, 1995 by The Procter & Gamble Company; WO 95/30011 published November 9, 1995 by The Procter & Gamble Company; WO 95/29979 published November 9, 1995 by The Procter

& Gamble Company. Preferred protease enzymes for use herein are subtilisin, chymotrypsin and elastase-type protease enzymes.

Especially preferred for use herein are subtilisin-type protease enzymes. Subtilisin enzymes are naturally produced by *Bacillus alcalophilus*, *Bacillus amyloliquefaciens*, *Bacillus amylosaccharicus*, *Bacillus licheniformis*, *Bacillus lentus* and *Bacillus subtilis* microorganisms.

A particularly preferred substilisin-type enzyme is bacterial serine protease enzyme, and variants thereof, obtained from *Bacillus amyloliquefaciens*, *Bacillus licheniformis* and/or *Bacillus subtilis,* including Novo Industries A/S Alcalase®, Esperase® , Savinase® (Copenhagen, Denmark), Gist-brocades' Maxatase®, Maxacal® and Maxapem 15® (protein engineered Maxacal®) (Delft, Netherlands), and subtilisin BPN and BPN', which are commercially available.

Especially preferred are protease enzymes, and variants thereof, obtained from *Bacillus amyloliquefaciens*. One known enzyme is BPN'. The wild-type BPN' from *Bacillus amyloliquefaciens* is characterized by the amino acid sequence:

1							10												20
Ala	Gln	Ser	Val	Pro	Tyr	Gly	Val	Ser	Gln	Ile	Lys	Ala	Pro	Ala	Leu	His	Ser	Gln	Gly
							30												40
Tyr	Thr	Gly	Ser	Asn	Val	Lys	Val	Ala	Val	Ile	Asp	Ser	Gly	Ile	Asp	Ser	Ser	His	Pro
							50												60
Asp	Leu	Lys	Val	Ala	Gly	Gly	Ala	Ser	Met	Val	Pro	Ser	Glu	Thr	Asn	Pro	Phe	Gln	Asp
							70												80
Asn	Asn	Ser	His	Gly	Thr	His	Val	Ala	Gly	Thr	Val	Ala	Ala	Leu	Asn	Asn	Ser	Ile	Gly
							90												100
Val	Leu	Gly	Val	Ala	Pro	Ser	Ala	Ser	Leu	Tyr	Ala	Val	Lys	Val	Leu	Gly	Ala	Asp	Gly
							110												120

Ser Gly Gln Tyr Ser Trp Ile Ile Asn Gly Ile Glu Trp Ala Ile Ala Asn Asn Met Asp
130 140
Val Ile Asn Met Ser Leu Gly Gly Pro Ser Gly Ser Ala Ala Leu Lys Ala Ala Val Asp
150 160
Lys Ala Val Ala Ser Gly Val Val Val Val Ala Ala Ala Gly Asn Glu Gly Thr Ser Gly
170 180
Ser Ser Ser Thr Val Gly Tyr Pro Gly Lys Tyr Pro Ser Val Ile Ala Val Gly Ala Val
190 200
Asp Ser Ser Asn Gln Arg Ala Ser Phe Ser Ser Val Gly Pro Glu Leu Asp Val Met Ala
210 220
Pro Gly Val Ser Ile Gln Ser Thr Leu Pro Gly Asn Lys Tyr Gly Ala Tyr Asn Gly Thr
230 240
Ser Met Ala Ser Pro His Val Ala Gly Ala Ala Ala Leu Ile Leu Ser Lys His Pro Asn
250 260
Trp Thr Asn Thr Gln Val Arg Ser Ser Leu Glu Asn Thr Thr Thr Lys Leu Gly Asp Ser
270 275
Phe Tyr Tyr Gly Lys Lys Gly Leu Ile Asn Asn Val Gln Ala Ala Ala Gln

Variants of BPN', hereafter referred to as "Protease A", are disclosed in U.S. Patent 5,030,378 (issued to Venegas, July 9, 1991) as characterized by the BPN' amino acid sequence with the following mutations:

a.) the Gly at position Gly166 is replaced with Asn, Ser, Lys, Arg, His, Gln, Ala or Glu; the Gly at position Gly169 is replaced with Ser; the Met at position Met222 is replaced with Gln, Phe, Cys, His, Asn, Glu, Ala or Thr; or

b.) the Gly at position Gly166 is replaced with Lys and the Met at position Met222 is replaced with Cys; or

c.) the Gly at position Gly160 is replaced with Ala and the Met at position Met222 is replaced with Ala.

Additional variants of BPN', heretoforth referred to as "Protease B", are disclosed by Genencor International, Inc. (San Francisco, California) European Patent EP-B-251,446 (granted December 28, 1994 and published January 7, 1988) as characterized by the wild-type BPN' amino acid with the mutations in one or more of the following amino acids: Tyr21, Thr22, Ser24, Asp36, Ala 45, Ala48, Ser49, Met50, His67, Ser87, Lys94, Val95, Gly97, Ser101, Gly102, Gly103, Ile107, Gly110, Met 124, Gly127, Gly128, Pro129, Leu135, Lys170, Tyr171, Pro172, Asp197, Met 199, Ser 204, Lys213, Tyr214, Gly215, and Ser221; or two or more of the amino acids listed above and Asp32, Ser33, Tyr104, Ala152, Asn155, Glu156, Gly166, Gly169, Phe189, Tyr217, and Met222 wherein both mutations cannot be made on the Asp32, Ser33, Tyr104, Ala152, Asn155, Glu156, Gly166, Gly169, Phe189, Tyr217, and Met222 amino acids.

Another preferred BPN' variant protease, hereafter referred to as "Protease D", is described in WO 95/10615 published April 20, 1995 by Genencor International as characterized by the wild-type BPN' amino acid with mutation to position Asn76, in combination with mutations in one or more other amino acid positions selected from the group consisting of Asp99, Ser101, Gln103, Tyr104, Ser105, Ile107, Asn109, Asn123, Leu126, Gly127, Gly128, Leu135, Glu156, Gly166, Glu195, Asp197, Ser204, Gln206, Pro210, Ala216, Tyr217, Asn218, Met222, Ser260, Lys265, and/or Ala274.

Another preferred BPN' variant protease, hereafter referred to as "Protease F", is described in U.S. Patent Number 4,760,025, issued to Estell, et al. on July 26, 1988 as characterized by the wild-type BPN' amino acid with mutation to one or more amino acid positions selected from the group consisting of Asp32, Ser33, His64, Tyr104, Asn155, Glu156, Gly166, Gly169, Phe189, Tyr217, and Met222.

Preferred proteolytic enzymes, then, are selected from the group consisting of Alcalase®, BPN', Protease A, Protease B, Protease D, and Protease F, and mixtures thereof. Protease F is most preferred.

Compositions for use herein comprise from about 0.0001% to about 1%, more preferably from about 0.001% to about 0.5%, even more preferably from about 0.005% to about 0.1%, by weight, of protease enzyme.

Polyhydric Alcohol

The compositions for use herein comprise at least one polyhydric alcohol in a concentration of from about 0.1% to about 20%, preferably from about 0.5% to about 18%, more preferably from about 2% to about 15%, and even more preferably from about 5% to about 12% by weight, of the polyhydric alcohol, or mixtures thereof.

For the purposes of this invention a polyhydric alcohol is considered any organic compound comprising two, or more, alcohol functions or alkoxylated derivatives thereof. In addition it is preferred that, if the composition has the form of an oil in water emulsion, that the polyhydric alcohol is present in the continuous phase.

Suitable polyhydric alcohols for use herein include polyalkylene glycols and more preferably alkylene polyols and their derivatives, including propylene glycol, dipropylene glycol, polypropylene glycol, polyethylene glycol and derivatives thereof, sorbitol, hydroxypropyl sorbitol, erythritol, threitol, pentaerythritol, xylitol, glucitol, mannitol, hexylene glycol, butylene glycol (e.g., 1,3-butylene glycol), hexane triol (e.g., 1,2,6-hexanetriol), trimethylol propane, neopentyl glycol, glycerine, ethoxylated glycerine, propane-1,3 diol, propoxylated glycerine and mixtures thereof. The alkoxylated derivatives of any of the above polyhydric alcohols are also suitable for use herein.

Preferred polyhydric alcohols of the present invention are selected from glycerine, butylene glycol, propylene glycol, dipropylene glycol, polyethylene glycol, hexane triol, ethoxylated glycerine and propoxylated glycerine, and mixtures thereof. Most preferred

polyhydric alcohols for use in the present invention are glycerine, butylene glycol, propylene glycol, polyethylene glycol and mixtures thereof.

Optional Ingredients

The compositions used herein can comprise a wide variety of optional ingredients.

Carrier

The compositions of the present invention comprise a safe and effective amount of a dermatologically acceptable carrier, suitable for topical application to the skin or hair within which the essential materials and optional other materials are incorporated to enable the essential materials and optional components to be delivered to the skin or hair at an appropriate concentration. The carrier can thus act as a diluent, dispersant, solvent, or the like for the essential components which ensures that they can be applied to and distributed evenly over the selected target at an appropriate concentration.

The carrier can be solid, semi-solid or liquid. Highly preferred carriers are liquid or semi-solid, such as creams, lotions and gels. Preferably the carrier is in the form of a lotion, cream or a gel, more preferably one which has a sufficient thickness or yield point to prevent the particles from sedimenting. The carrier can itself be inert or it can possess dermatological benefits of its own. The carrier should also be physically and chemically compatible with the essential components described herein, and should not unduly impair stability, efficacy or other use benefits associated with the compositions of the present invention.

The type of carrier ultilised in the present invention depends on the type of product form desired for the composition. The topical compositions useful in the subject invention may be made into a wide variety of product forms such as are known in the art. These include, but are not limited to, lotions, creams, gels, sticks, ointments, pastes and mousses. These

product forms may comprise several types of carriers including, but not limited to, solutions, emulsions, and gels.

Preferred carriers contain a dermatologically acceptable, hydrophilic diluent. Suitable hydrophilic diluents include water, organic hydrophilic diluents such as C_1 - C_4 monohydric alcohols and low molecular weight glycols and polyols, including propylene glycol, polyethylene glycol (e.g. of MW 200-600), polypropylene glycol (e.g. of MW 425-2025), glycerol, butylene glycol, 1,2,4-butanetriol, sorbitol esters, 1,2,6-hexametriol, ethanol, iso-propanol, sorbitol esters, ethoxylated ethers, propoxylated ethers and combinations thereof. The diluent is preferably liquid. Water is an especially preferred diluent. The composition preferably comprises at least about 20% of the hydrophilic diluent.

Preferred carriers comprise an emulsion comprising a hydrophilic phase, especially an aqueous phase, and a hydrophobic phase e.g., a lipid, oil or oily material. As well known to one skilled in the art, the hydrophilic phase will be dispersed in the hydrophobic phase, or vice versa, to form respectively hydrophilic or hydrophobic dispersed and continuous phases, depending on the composition ingredients. In emulsion technology, the term "dispersed phase" is a term well-known to one skilled in the art which means that the phase exists as small particles or droplets that are suspended in and surrounded by a continuous phase. The dispersed phase is also known as the internal or discontinuous phase. The emulsion may be or comprise (e.g., in a triple or other multi-phase emulsion) an oil-in-water emulsion or a water-in-oil emulsion such as a water-in-silicone emulsion. Oil-in-water emulsions typically comprise from about 1% to about 60% (preferably about 1% to about 30%) of the dispersed hydrophobic phase and from about 1% to about 99% (preferably from about 40% to about 90%) of the continuous hydrophilic phase; water-in-oil emulsions typically comprise from about 1% to about 98% (preferably from about 40% to about 90%) of the dispersed hydrophilic phase and from about 1% to about 50% (preferably about 1% to about 30%) of the continuous hydrophobic phase. Preferred compositions herein are oil-in-water emulsions.

Skin Care Active

A preferred ingredient the compositions herein comprise a skin care active at a level from about 0.1% to about 20%, preferably from about 1% to about 10%, more preferably from about 2% to about 8%, by weight.

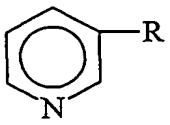
The skin care active for use herein is selected from a vitamin B_3 component, panthenol, vitamin E, vitamin E acetate, retinol, retinyl propionate, retinyl palmitate, retinoic acid, vitamin C, theobromine, α-hydroxyacid, farnesol, phytantriol, salicylic acid, and mixtures thereof.

The preferred skin care active for use herein from the viewpoint of providing improved skin hydration is a vitamin B_3 component.

Vitamin B3 component

The compositions of the present invention preferably comprise from about 0.01% to about 20%, more preferably from about 0.1% to about 15%, even more preferably from about 0.5% to about 10%, and still more preferably from about 1% to about 8%, most preferably from about 1.5% to about 6%, of the vitamin B_3 compound.

As used herein, "vitamin B_3 compound" means a compound having the formula:



wherein R is - $CONH_2$ (i.e., niacinamide), - COOH (i.e., nicotinic acid) or - CH_2OH (i.e., nicotinyl alcohol); derivatives thereof; and salts of any of the foregoing. Exemplary derivatives of the foregoing vitamin B_3 compounds include nicotinic acid esters, including non-vasodilating esters of nicotinic acid, nicotinyl amino acids, nicotinyl alcohol esters of carboxylic acids, nicotinic acid N-oxide and niacinamide N-oxide.

Suitable esters of nicotinic acid include nicotinic acid esters of C_1-C_{22}, preferably C_1-C_{16}, more preferably C_1-C_6 alcohols. The alcohols are suitably straight-chain or branched chain, cyclic or acyclic, saturated or unsaturated (including aromatic), and substituted or unsubstituted. The esters are preferably non-vasodilating. As used herein, "non-vasodilating" means that the ester does not commonly yield a visible flushing response after application to the skin in the subject compositions (the majority of the general population would not experience a visible flushing response, although such compounds may cause vasodilation not visible to the naked eye). Non-vasodilating esters of nicotinic acid include tocopherol nicotinate and inositol hexanicotinate; tocopherol nicotinate is preferred. A more complete description of vitamin B_3 compounds is given in WO 98/22085.

Examples of the above vitamin B_3 compounds are well known in the art and are commercially available from a number of sources, e.g., the Sigma Chemical Company (St. Louis, MO); ICN Biomedicals, Inc. (Irvin, CA) and Aldrich Chemical Company (Milwaukee, WI). One or more vitamin B_3 compounds may be used herein. Preferred vitamin B_3 compounds are niacinamide and tocopherol nicotinate. Niacinamide is more preferred.

Retinoids

Another suitable skin care active is a retinoid. As used herein, "retinoid" includes all natural and/or synthetic analogs of Vitamin A or retinol-like compounds which possess the biological activity of Vitamin A in the skin as well as the geometric isomers and stereoisomers of these compounds.

The retinoid is preferably retinol, retinol esters (e.g., C_2 - C_{22} alkyl esters of retinol, including retinyl palmitate, retinyl acetate, retinyl proprionate), retinal, and/or retinoic acid (including all-trans retinoic acid and/or 13-cis-retinoic acid), more preferably retinoids other than retinoic acid. These compounds are well known in the art and are commercially available from a number of sources, e.g., Sigma Chemical Company (St.

Louis, MO), and Boehringer Mannheim (Indianapolis, IN). Preferred retinoids are retinol, retinyl palmitate, retinyl acetate, retinyl proprionate, retinal, retinoic acid and combinations thereof. More preferred are retinol, retinoic propionate, retinoic acid and retinyl palmitate. The retinoid may be included as the substantially pure material, or as an extract obtained by suitable physical and/or chemical isolation from natural (e.g., plant) sources.

The compositions preferably contain from or about 0.005% to or about 2%, more preferably 0.01% to about 2% retinoid. Retinol is most preferably used in an amount of from or about 0.01% to or about 0.15%; retinol esters are most preferably used in an amount of from about 0.01% to about 2% (e.g., about 1%).

It is very highly preferred that the compositions suitable for use in the present invention comprise a vitamin complex consisting of from about 1% to about 5%, by weight, of vitamin B_3 compound or its derivatives; and from about 0.1% to about 1%, by weight, of a retinol compound or its derivatives in conjunction with from about 0.1% to about 1%, by weight, panthenol or its derivatives.

Additional Humectants

The compositions of the present invention may comprise additional humectants which are preferably present at a level of from about 0.01% to about 20%, more preferably from about 0.1% to about 15% and especially from about 0.5% to about 10%.

Preferred humectants include, but are not limited to, compounds selected from urea, D or DL panthenol, calcium pantothenate, royal jelly, panthetine, pantotheine, panthenyl ethyl ether, pangamic acid, pyridoxin, pantoyl lactose Vitamin B complex, hexane - 1, 2, 6, - triol, guanidine or its derivatives. Highly preferred humectants are urea, panthenol and mixtures thereof. The above listed compounds may be incorporated singly or in combination.

Suitable additional humectants useful herein are sodium 2-pyrrolidone-5-carboxylate (NaPCA), guanidine; glycolic acid and glycolate salts (e.g. ammonium and quaternary

alkyl ammonium); lactic acid and lactate salts (e.g. ammonium and quaternary alkyl ammonium); aloe vera in any of its variety of forms (e.g., aloe vera gel); hyaluronic acid and derivatives thereof (e.g., salt derivatives such as sodium hyaluronate); lactamide monoethanolamine; acetamide monoethanolamine; urea; panthenol and derivatives thereof; and mixtures thereof.

At least part (up to about 5% by weight of composition) of an additional humectant can be incorporated in the form of an admixture with a particulate cross-linked hydrophobic acrylate or methacrylate copolymer, itself preferably present in an amount of from about 0.1% to about 10%, which can be added either to the aqueous or disperse phase. This copolymer is particularly valuable for reducing shine and controlling oil while helping to provide effective moisturization benefits and is described in further detail by WO96/03964, incorporated herein by reference.

The above listed compounds may be incorporated singly or in combination. Preferred additional humectants are selected from urea, panthenol and mixtures thereof.

Emollients

The oil in water emulsions of the present invention generally comprise from about 1% to about 20%, preferably from about 1.5% to about 15%, more preferably from about 0.1% to about 8%, especially from about 0.5% to about 5% of a dermatologically acceptable emollient.

Emollients tend to lubricate the skin, increase the smoothness and suppleness of the skin, prevent or relieve dryness of the skin, and/or protect the skin. Emollients are typically water-immiscible, oily or waxy materials and emollients with high molecular weights can confer tacky properties to a topical composition. A wide variety of suitable emollients are known and may be used herein. Sagarin, Cosmetics, Science and Technology, 2nd Edition, Vol. 1, pp. 32-43 (1972), contains numerous examples of materials suitable as an emollient. All emollients discussed in application WO 00/24372 should be considered as suitable for use in the present invention although preferred examples are outlined in further detail below:

i) Straight and branched chain hydrocarbons having from about 7 to about 40 carbon atoms, such as dodecane, squalane, cholesterol, hydrogenated polyisobutylene, isohexadecane, isoeicosane, isooctahexacontane, isohexapentacontahectane, and the C_7-C_{40} isoparaffins, which are C_7-C_{40} branched hydrocarbons. Suitable branched chain hydrocarbons for use herein are selected from isopentacontaoctactane, petrolatum, and mixtures thereof. Suitable for use herein are branched chain aliphatic hydrocarbons sold under the trade name Permethyl (RTM) and commercially available from Presperse Inc., P.O. Box 735, South Plainfield, N.J. 07080, U.S.A.

ii) C_1-C_{30} alcohol esters of C_1-C_{30} carboxylic acids, C12-15 alkyl benzoates, and of C_2-C_{30} dicarboxylic acids, e.g. isononyl isononanoate, isostearyl neopentanoate. isodecyl octanoate, isodecyl isononanoate, tridecyl isononanoate, myristyl octanoate, octyl pelargonate, octyl isononanoate, myristyl myristate, myristyl neopentanoate, myristyl octanoate, isopropyl myristate, myristyl propionate, isopropyl stearate, isopropyl isostearate, methyl isostearate, behenyl behenate, dioctyl maleate, diisopropyl adipate, and diisopropyl dilinoleate and mixtures thereof.

iii) C_1-C_{30} mono- and poly- esters of sugars and related materials. These esters are derived from a sugar or polyol moiety and one or more carboxylic acid moieties. Depending on the constituent acid and sugar, these esters can be in either liquid or solid form at room temperature. Examples include: glucose tetraoleate, the galactose tetraesters of oleic acid, the sorbitol tetraoleate, sucrose tetraoleate, sucrose pentaoleate, sucrose hexaoleate, sucrose heptaoleate, sucrose octaoleate, sorbitol hexaester in which the carboxylic acid ester moieties are palmitoleate and arachidate in a 1:2 molar ratio, and the octaester of sucrose wherein the esterifying carboxylic acid moieties are laurate, linoleate and behenate in a 1:3:4 molar ratio. Other materials include cottonseed oil or soybean oil fatty acid esters of sucrose. Other examples of such materials are described in WO 96/16636, incorporated by reference herein. A particularly preferred material is known by the INCI name sucrose polycottonseedate

iv) Vegetable oils and hydrogenated vegetable oils. Examples of vegetable oils and hydrogenated vegetable oils include safflower oil, coconut oil, cottonseed oil, menhaden oil, palm kernel oil, palm oil, peanut oil, soybean oil, rapeseed oil, linseed oil, rice bran oil, pine oil, sesame oil, sunflower seed oil, partially and fully hydrogenated oils from the foregoing sources, and mixtures thereof

v) Soluble or colloidally-soluble moisturising agents. Examples include hylaronic acid and starch-grafted sodium polyacrylates such as Sanwet (RTM) IM-1000, IM-1500 and IM-2500 available from Celanese Superabsorbent Materials, Portsmith, VA, USA and described in USA-A-4,076,663.

Preferred emollients for use herein are isohexadecane, isooctacontane, petrolatum, isononyl isononanoate, isodecyl octanoate, isodecyl isononanoate, tridecyl isononanoate, myristyl octanoate, octyl isononanoate, myristyl myristate, methyl isostearate, isopropyl isostearate, C12-15 alkyl benzoates and mixtures thereof. Particularly preferred emollients for use herein are isohexadecane, isononyl isononanoate, methyl isostearate, isopropyl isostearate, petrolatum, or mixtures thereof. Due to its poor skin feel properties castor oil is not a preferred emollient for use herein.

Emulsifiers/Surfactants

Compositions herein preferably contain an emulsifier and/or surfactant, generally to help disperse and suspend the disperse phase within the continuous aqueous phase. A surfactant may also be useful if the product is intended for skin cleansing. For convenience hereinafter emulsifiers will be referred to under the term 'surfactants', thus 'surfactant(s)' will be used to refer to surface active agents whether used as emulsifiers or for other surfactant purposes such as skin cleansing. Known or conventional surfactants can be used in the composition, provided that the selected agent is chemically and physically compatible with essential components of the composition, and provides the desired characteristics. Suitable surfactants include non-silicone derived materials, and mixtures thereof. All surfactants discussed in application WO 00/24372 should be considered as suitable for use in the present invention.

The compositions of the present invention preferably comprise from about 0.05% to about 15% of a surfactant or mixture of surfactants. The exact surfactant or surfactant mixture chosen will depend upon the pH of the composition and the other components present.

Preferred surfactants are nonionic. Among the nonionic surfactants that are useful herein are those that can be broadly defined as condensation products of long chain alcohols, e.g. C_{8-30} alcohols, with sugar or starch polymers ie glycosides. Other useful nonionic surfactants include the condensation products of alkylene oxides with fatty acids (i.e. alkylene oxide esters of fatty acids). These materials have the general formula $RCO(X)_nOH$ wherein R is a C_{10-30} alkyl group, X is $-OCH_2CH_2-$ (i.e. derived from ethylene glycol or oxide) or $-OCH_2CHCH_3-$ (i.e. derived from propylene glycol or oxide), and n is an integer from about 6 to about 200. Other nonionic surfactants are the condensation products of alkylene oxides with 2 moles of fatty acids (i.e. alkylene oxide diesters of fatty acids). These materials have the general formula $RCO(X)_nOOCR$ wherein R is a C_{10-30} alkyl group, X is $-OCH_2CH_2-$(i.e. derived from ethylene glycol or oxide) or $-OCH_2CHCH_3-$(i.e. derived from propylene glycol or oxide), and n is an integer from about 6 to about 100. An emulsifier for use herein is most preferably a fatty acid ester blend based on a mixture of sorbitan fatty acid ester and sucrose fatty acid ester, especially a blend of sorbiton stearate and sucrose cocoate. This is commercially available from ICI under the trade name Arlatone 2121. Even further suitable examples include a mixture of cetearyl alcohols, cetearyl glucosides such as those available under the trade name Montanov 68 from Seppic and Emulgade PL68/50 available from Henkel..

The hydrophilic surfactants useful herein can alternatively or additionally include any of a wide variety of cationic, anionic, zwitterionic, and amphoteric surfactants such as are known in the art. See, e.g., McCutcheon's, Detergents and Emulsifiers, North American Edition (1986), published by Allured Publishing Corporation; U.S. Patent No. 5,011,681 to Ciotti et al., issued April 30, 1991; U.S. Patent No. 4,421,769 to Dixon et al., issued December 20, 1983; and U.S. Patent No. 3,755,560 to Dickert et al., issued August 28, 1973. A wide variety of anionic surfactants are also useful herein. See, e.g., U.S. Patent No. 3,929,678, to Laughlin et al., issued December 30, 1975.

A wide variety of anionic surfactants are also useful herein. See, e.g., U.S. Patent No. 3,929,678, to Laughlin et al., issued December 30, 1975. Exemplary anionic surfactants include the alkoyl isethionates (e.g., C_{12} - C_{30}), alkyl and alkyl ether sulfates and salts thereof, alkyl and alkyl ether phosphates and salts thereof, alkyl methyl taurates (e.g., C_{12} - C_{30}), and soaps (e.g., alkali metal salts, e.g., sodium or potassium salts) of fatty acids.

Amphoteric and zwitterionic surfactants are also useful herein. Examples of amphoteric and zwitterionic surfactants which can be used in the compositions of the present invention are those which are broadly described as derivatives of aliphatic secondary and tertiary amines in which the aliphatic radical can be straight or branched chain and wherein one of the aliphatic substituents contains from about 8 to about 22 carbon atoms (preferably C_8 - C_{18}) and one contains an anionic water solubilising group, e.g., carboxy, sulfonate, sulfate, phosphate, or phosphonate. Examples are alkyl imino acetates, and iminodialkanoates and aminoalkanoates, imidazolinium and ammonium derivatives. Other suitable amphoteric and zwitterionic surfactants are those selected from the group consisting of betaines, sultaines, hydroxysultaines, and branched and unbranched alkanoyl sarcosinates, and mixtures thereof.

Preferred emulsions of the present invention include a silicone containing emulsifier or surfactant. A wide variety of silicone emulsifiers are useful herein. These silicone emulsifiers are typically organically modified organopolysiloxanes, also known to those skilled in the art as silicone surfactants. Useful silicone emulsifiers include dimethicone copolyols. These materials are polydimethyl siloxanes which have been modified to include polyether side chains such as polyethylene oxide chains, polypropylene oxide chains, mixtures of these chains, and polyether chains containing moieties derived from both ethylene oxide and propylene oxide. Other examples include alkyl-modified dimethicone copolyols, i.e., compounds which contain C_2-C_{30} pendant side chains. Still other useful dimethicone copolyols include materials having various cationic, anionic, amphoteric, and zwitterionic pendant moieties.

Polymeric Thickening Agents

The compositions of the present invention can comprise at least one polymeric thickening agent.

The polymeric thickening agents useful herein preferably have a number average molecular weight of greater than 20,000, more preferably greater than 50,000 and especially greater than 100,000.

In general, the compositions of the present invention may comprise from about 0.01% to about 10%, preferably from about 0.1% to about 8% and most preferably from about 0.5% to about 5% by weight of the composition of the polymeric thickening agent, or mixtures thereof.

Preferred polymer thickening agents for use herein include non-ionic thickening agents and anionic thickening agents, or mixtures thereof. Suitable non-ionic thickening agents include polyacrylamide polymers, crosslinked poly(N-vinylpyrrolidones), polysaccharides, natural or synthetic gums, polyvinylpyrrolidone, and polyvinylalcohol. Suitable anionic thickening agents include acrylic acid/ethyl acrylate copolymers, carboxyvinyl polymers and crosslinked copolymers of alkyl vinyl ethers and maleic anhydride. Particularly preferred thickening agents for use herein are the non-ionic polyacrylamide polymers such as polyacrylamide and isoparaffin and laureth-7, available under the trade name Sepigel 305 from Seppic Corporation, and acrylic acid/ethyl acrylate copolymers and the carboxyvinyl polymers sold by the B.F. Goodrich Company under the trade mark of Carbopol resins, or mixtures thereof. Suitable Carbopol resins may be hydrophobically modified, and other suitable resins are described in WO98/22085, or mixtures thereof.

Silicone Oil

The present compositions preferably comprise, at least one silicone oil phase. Silicone oil phase(s) generally comprises from about 0.1% to about 20%, preferably from about 0.5% to about 10%, more preferably from about 0.5% to about 5%, of the composition. The, or each, silicone oil phase preferably comprises one or more silicone components.

Silicone components can be fluids, including straight chain, branched and cyclic silicones. Suitable silicone fluids useful herein include silicones inclusive of polyalkyl siloxane fluids, polyaryl siloxane fluids, cyclic and linear polyalkylsiloxanes, polyalkoxylated silicones, amino and quaternary ammonium modified silicones, polyalkylaryl siloxanes or a polyether siloxane copolymer and mixtures thereof. The silicone fluids can be volatile or non-volatile. Silicone fluids generally have a weight average molecular weight of less than about 200,000. Suitable silicone fluids have a molecular weight of about 100,000 or less, preferably about 50,000 or less, most preferably about 10,000 or less. Preferably the silicone fluid is selected from silicone fluids having a weight average molecular weight in the range from about 100 to about 50,000 and preferably from about 200 to about 40,000. Typically, silicone fluids have a viscosity ranging from about 0.65 to about 600,000 $mm^2.s^{-1}$, preferably from about 0.65 to about 10,000 $mm^2.s^{-1}$ at 25°C. The viscosity can be measured by means of a glass capillary viscometer as set forth in Dow Corning Corporate Test Method CTM0004, July 29, 1970. Suitable polydimethyl siloxanes that can be used herein include those available, for example, from the General Electric Company as the SF and Viscasil (RTM) series and from Dow Corning as the Dow Corning 200 series. Also useful are essentially non-volatile polyalkylarylsiloxanes, for example, polymethylphenylsiloxanes, having viscosities of about 0.65 to 30,000 $mm^2.s^{-1}$ at 25°C. These siloxanes are available, for example, from the General Electric Company as SF 1075 methyl phenyl fluid or from Dow Corning as 556 Cosmetic Grade Fluid. Cyclic polydimethylsiloxanes suitable for use herein are those having a ring structure incorporating from about 3 to about 7 $(CH_3)_2SiO$ moieties.

In preferred embodiments, the silicone fluid is selected from dimethicone, decamethylcyclopentasiloxane, octamethylcyclotetrasiloxane, phenyl methicone, and mixtures thereof.

Silicone gums can also be used herein. The term "silicone gum" herein means high molecular weight silicones having a weight average molecular weight in excess of about 200,000 and preferably from about 200,000 to about 4,000,000. Iincluded are non-

volatile polyalkyl and polyaryl siloxane gums. In preferred embodiments, a silicone oil phase comprises a silicone gum or a mixture of silicones including the silicone gum. Typically, silicone gums have a viscosity at 25°C in excess of about 1,000,000 mm^2s^{-1}. The silicone gums include dimethicones as described by Petrarch and others including US-A-4,152,416, May 1, 1979 to Spitzer, et al, and Noll, Walter, Chemistry and Technology of Silicones, New York: Academic Press 1968. Also describing silicone gums are General Electric Silicone Rubber Product Data Sheets SE 30, SE 33, SE 54 and SE 76. Specific examples of silicone gums include polydimethylsiloxane, (polydimethylsiloxane)(methylvinylsiloxane) copolymer, poly(dimethylsiloxane)-(diphenyl)(methylvinylsiloxane) copolymer and mixtures thereof. Preferred silicone gums for use herein are silicone gums having a molecular weight of from about 200,000 to about 4,000,000 selected from dimethiconol, and dimethicone and mixtures thereof.

A silicone phase herein preferably comprises a silicone gum incorporated into the composition as part of a silicone gum-fluid blend. When the silicone gum is incorporated as part of a silicone gum-fluid blend, the silicone gum preferably constitutes from about 5% to about 40%, especially from about 10% to 20% by weight of the silicone gum-fluid blend. Suitable silicone gum-fluid blends herein are mixtures consisting essentially of:

(i) a silicone having a molecular weight of from about 200,000 to about 4,000,000 selected from dimethiconol, fluorosilicone and dimethicone and mixtures thereof; and

(ii) a carrier which is a silicone fluid, the carrier having a viscosity from about 0.65 $mm^2.s^{-1}$ to about 100 $mm^2.s^{-1}$,

wherein the ratio of i) to ii) is from about 10:90 to about 20:80 and wherein said silicone gum-based component has a final viscosity of from about 100 $mm^2.s^{-1}$ to about 100,000 $mm^2.s^{-1}$, preferably from 500 $mm^2.s^{-1}$ to about 10,000 $mm^2.s^{-1}$.

An especially preferred silicone-gum fluid blend based component for use in the compositions herein is a dimethiconol gum having a molecular weight of from about

200,000 to about 4,000,000 along with a silicone fluid carrier with a viscosity of about 0.65 to 100 $mm^2.s^{-1}$. An example of this silicone component is Dow Corning Q2-1403 (85% 5 $mm^2.s^{-1}$ Dimethicone Fluid/15% Dimethiconol) and Dow Corning Q2-1401 available from Dow Corning.

Further silicone components suitable for use in a silicone oil phase herein are crosslinked polyorganosiloxane polymers, optionally dispersed in a fluid carrier. In general, when present the crosslinked polyorganosiloxane polymers, together with its carrier (if present) comprises 0.1% to about 20%, preferably from about 0.5% to about 10%, more preferably from about 0.5% to about 5% of the composition. Such polymers comprise polyorganosiloxane polymers crosslinked by a crosslinking agent. Suitable crosslinking agents are disclosed in WO98/22085. Examples of suitable polyorganosiloxane polymers for use herein include methyl vinyl dimethicone, methyl vinyl diphenyl dimethicone and methyl vinyl phenyl methyl diphenyl dimethicone.

Specific commercially available crosslinked polyorganosiloxane polymers for use herein are silicone vinyl crosspolymer mixtures available under the tradename KSG supplied by Shinetsu Chemical Co., Ltd, for example KSG-15, KSG-16, KSG-17, KSG-18. These materials contain a combination of crosslinked polyorganosiloxane polymer and silicone fluid. Particularly preferred for use herein especially in combination with the organic amphiphilic emulsifier material is KSG-18. The assigned INCI names for KSG-15, KSG-16, KSG-17 and KSG-18 are cyclomethicone dimethicone/vinyl dimethicone crosspolymer, dimethicone dimethicone/vinyl dimethicone crosspolymer, cyclomethicone dimethicone/vinyl dimethicone crosspolymer and phenyl trimethicone dimethicone/phenyl vinyl dimethicone crosspolymer, respectively.

Another class of silicone components suitable for use in a silicone oil phase herein includes polydiorganosiloxane-polyoxyalkylene copolymers containing at least one polydiorganosiloxane segment and at least one polyoxyalkylene segment. Suitable polydiorganosiloxane segments and copolymers thereof are disclosed in WO98/22085. Suitable polydiorganosiloxane-polyalkylene copolymers are available commercially under

the tradenames Belsil (RTM) from Wacker-Chemie GmbH, Geschäftsbereich S, Postfach D-S000 Munich 22 and Abil (RTM) from Th. Goldschmidt Ltd., Tego House, Victoria Road, Ruislip, Middlesex, HA4 0YL, for example Belsil (RTM) 6031 and Abil (RTM) B8S183. A particularly preferred copolymer fluid blend for use herein includes Dow Corning DC3225C which has the CTFA designation Dimethicone/Dimethicone copolyol.

Sunscreens

Compositions of the present invention preferably comprise an organic sunscreen. Suitable sunscreens can have UVA absorbing properties, UVB absorbing properties or a mixture thereof. The exact amount of the sunscreen active will vary depending upon the desired Sun Protection Factor, ie the "SPF" of the composition as well as the desired level of UV protection. The compositions of the present invention preferably comprise an SPF of at least 10, preferably at least 15. SPF is a commonly used measure of photoprotection of a sunscreen against erythema. The SPF is defined as a ratio of the ultraviolet energy required to produce minimal erythema on protected skin to that required to products the same minimal erythema on unprotected skin in the same individual. See Federal Register, 43, No 166, pp. 38206-38269, August 25, 1978). Amounts of the sunscreen used are typically from about 2% to about 20%, more typically from about 4% to about 14%. Suitable sunscreens include, but are not limited to, those found in the *CTFA International Cosmetic Ingredient Dictionary and Handbook, 7th edition, volume 2 pp. 1672, edited by Wenninger and McEwen (The Cosmetic, Toiletry, and Fragrance Association, Inc., Washington, D. C., 1997).*

The compositions of the present invention preferably comprise a UVA absorbing sunscreen actives which absorb UV radiation having a wavelength of from about 320nm to about 400nm. Suitable UVA absorbing sunscreen actives are selected from dibenzoylmethane derivatives, anthranilate derivatives such as methylanthranilate and homomethyl, 1-N-acetylanthranilate, and mixtures thereof. Examples of dibenzoylmethane sunscreen actives are described in US Patent No 4,387,089 issued to Depolo; and in Sunscreens: Development, Evaluation, and Regulatory Aspects edited by N. J. Lowe and N. A. Shaath, Marcel Dekker, Inc (1990). The UVA absorbing sunscreen

active is preferably present in an amount to provide broad spectrum UVA protection either independently, or in combination with, other UV protective actives which may be present in the composition.

Preferred UVA sunscreen actives are dibenzoylmethane sunscreen actives and their derivatives. They include, but are not limited to, those selected from 2-methyldibenzoylmethane, 4-methyldibenzoylmethane, 4-isopropyldibenzoylmethane, 4-tert-butyldibenzoylmethane, 2, 4-dimethyldibenzoylmethane, 2, 5-dimethyldibenzoylmethane, 4, 4'-diisopropylbenzoylmethane, 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane, 2-methyl-5-isopropyl-4'-methoxydibenzoylmethane, 2-methyl-5-tert-butyl-4'-methoxy-dibenzoylmethane, 2, 4-dimethyl-4'-methoxydibenzoylmethane, 2, 6-dimethyl-4'-tert-butyl-4'methoxydibenzoylmethane, and mixtures thereof. Preferred dibenzoyl sunscreen actives include those selected from 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane, 4-isopropyldibenzoylmethane, and mixtures thereof. A more preferred sunscreen active is 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane.

The sunscreen active 4-(1, 1-dimethylethyl)-4'-methoxydibenzoylmethane, which is also known as butyl methoxydibenzoylmethane or Avobenzone, is commercially available under the names of Parsol® 1789 from Givaudan Roure (International) S. A. (Basel, Switzerland) and Eusolex® 9020 from Merck & Co., Inc (Whitehouse Station, NJ). The sunscreen 4-isoproplydibenzoylmethane, which is also known as isopropyldibenzoylmethane, is commercially available from Merck under the name of Eusolex® 8020.

The compositions of the present invention preferably further comprise a UVB sunscreen active which absorbs UV radiation having a wavelength of from about 290nm to abut 320nm. The compositions comprise an amount of the UVB sunscreen active which is safe and effective to provide UVB protection either independently, or in combination with, other UV protective actives which may be present in the compositions. The compositions preferably comprise from about 0.1% to abut 16%, more preferably from

about 0.1% to about 12%, and most preferably from about 0.5% to about 8% by weight, of UVB absorbing organic sunscreen.

A wide variety of UVB sunscreen actives are suitable for use herein. Nonlimiting examples of such organic sunscreen actives are described in US Patent No 5,087,372 issued February 11, 1992 to Haffey et al.; and US Patent Nos 5,073,371 and 5,073,372 both issued on December 17, 1991 to Turner et al. and Segarin, et al., at Chapter VIII, pages 189 et seq., of Cosmetics Science and Technology. Still other useful sunscreens are those disclosed in U.S. Patent No. 4,937,370, to Sabatelli, issued June 26, 1990; and U.S. Patent No. 4,999,186, to Sabatelli et al., issued March 12, 1991. Preferred UVB sunscreen actives are selected from 2-ethylhexyl-2-cyano-3, 2-ethylhexyl N,N-dimethyl-p-aminobenzoate, p-aminobenzoic acid, oxybenzone, homomenthyl salicylate, octyl salicylate, 4,4'-methoxy-t-butyldibenzoylmethane, 4-isopropyl dibenzoylmethane, 3-benzylidene camphor, 3-(4-methylbenzylidene) camphor, 3 -diphenylacrylate (referred to as octocrylene), 2-phenyl-benzimidazole-5-sulphonic acid (PBSA), cinnamates and their derivatives such as 2-ethylhexyl-p-methoxycinnamate and octyl-p-methoxycinnamate, TEA salicylate, octyldimethyl PABA, camphor derivatives and their derivatives, and mixtures thereof. Preferred organic sunscreen actives are 2-ethylhexyl-2-cyano-3, 3-diphenylacrylate (referred to as octocrylene), 2-phenyl- benzimidazole-5-sulphonic acid (PBSA), octyl-p-methoxycinnamate, and mixtures thereof. Salt and acid neutralised forms of the acidic sunscreens are also useful herein.

An agent may also be added to any of the compositions useful in the present invention to stabilise the UVA sunscreen to prevent it from photo-degrading on exposure to UV radiation and thereby maintaining its UVA protection efficacy. A wide range of compounds have been cited as providing these stabilising properties and should be chosen to compliment both the UVA sunscreen and the composition as a whole. Suitable stabilising agents include, but are not limited to, those described in US Patents Nos 5,972,316; 5,968,485; 5,935,556; 5,827,508 and Patent WO 00/06110. Preferred examples of stabilising agents for use in the present invention include 2-ethylhexyl-2-cyano-3, 3-diphenylacrylate (referred to as octocrylene), ethyl-2-cyano-3, 3-

diphenylacrylate, 2-ethylhexyl-3, 3-diphenylacrylate, ethyl-3, 3-bis(4-methoxyphenyl)acrylate, and mixtures thereof. 2-ethylhexyl-2-cyano-3, 3-diphenylacrylate is most preferred.

An agent may also be added to any of the compositions useful in the present invention to improve the skin substantivity of those compositions, particularly to enhance their resistance to being washed off by water, or rubbed off. A preferred agent which will provide this benefit is a copolymer of ethylene and acrylic acid. Compositions comprising this copolymer are disclosed in U.S. Patent 4,663,157, Brock, issued May 5, 1987.

In addition to the organic sunscreens compositions of the present invention can additionally comprise inorganic physical sunblocks. Nonlimiting examples of suitable physical sunblocks are described in CTFA International Cosmetic Ingredient Dictionary, 6th Edition, 1995, pp. 1026-28 and 1103, Sayre, R. M. et al., "Physical Sunscreens", J. Soc. Cosmet. Chem., vol 41, no 2, pp. 103-109 (1990). Preferred inorganic physical sunblocks are zinc oxide and titanium dioxide, and mixtures thereof.

When used, the physical sunblocks are present in an amount such that the present compositions are transparent on the skin (ie non-whitening), preferably less than or equal to about 5%. When titanium dioxide is used, it can have an anatase, rutile, or amorphous structure. Physical sunblock particles, eg titanium dioxide and zinc oxide, can be uncoated or coated with a variety of materials including but not limited to amino acids, aluminium compounds such as alumina, aluminium stearate, aluminium laurate, and the like; carboxylic acids and their salts eg stearic acid and its salts; phospholipids such as lecithin; organic silicone compounds; inorganic silicone compounds such as silica and silicates; and mixtures thereof. A preferred titanium dioxide is commercially available from Tayca (Japan) and is distributed by Tri-K Industries (Emerson, NJ) under the MT micro-ionised series (eg MT 100SAS).

The compositions of the present invention preferably comprise from about 0.1% to about 10%, more preferably from about 0.1% to about 4%, and most preferably from about 0.5% to about 2.5%, by weight, of inorganic sunscreen.

A wide variety of optional ingredients such as neutralising agents, perfumes, and colouring agents, can also be added to the compositions herein. It is preferred that any additional ingredients enhance the skin softness / smoothness benefits of the product. In addition it is preferred that any such ingredients do not negatively impact the aesthetic properties of the product. As such high levels of proteins such as collagen and elastin are not preferred in compositions useful in the present invention.

The compositions of the invention can also contain from about 0.01% to about 10%, preferably from about 0.1% to about 5% of a panthenol moisturizer. The panthenol moisturizer can be selected from D-panthenol ([R]-2,4-dihydroxy-N-[3-hydroxypropyl)]-3,3-dimethylbutamide), DL-panthenol, calcium pantothenate, royal jelly, panthetine, pantotheine, panthenyl ethyl ether, pangamic acid, pyridoxin, and pantoyl lactose.

In a preferred embodiment, the compositions of the present invention additionally comprise a salt selected from alkali metal and alkaline earth metal salts, and mixtures thereof, preferably sodium, calcium and magnesium salts, and mixtures thereof. Especially preferred for use herein are calcium and magnesium salts. The compositions herein preferably comprise from about 5ppm to about 500 ppm of the salt, based on the amount of metal ion.

In a further preferred embodiment, the compositions herein may comprise additional enzymes selected from lipases, phospholipases, glycosidases, lactoperoxidases and cellulases, and mixtures thereof.

Neutralizing agents suitable for use in neutralizing acidic group containing hydrophilic gelling agents herein include sodium hydroxide, potassium hydroxide, ammonium hydroxide, monoethanolamine, diethanolamine, amino methyl propanol, tris-buffer and triethanolamine.

Other optional materials include keratolytic agents; water-soluble or solubilizable preservatives preferably at a level of from about 0.1% to about 5%, such as Germall 115, methyl, ethyl, propyl and butyl esters of hydroxybenzoic acid, benzyl alcohol, DMDM

hydantoin iodopropanyl butylcarbanate available under the trade name Glydant Plus from Lonza, EDTA, Euxyl (RTM) K400, Bromopol (2-bromo-2-nitropropane-1,3-diol) and phenoxypropanol; anti-bacterials such as Irgasan (RTM) and phenoxyethanol (preferably at levels of from 0.1% to about 5%); soluble or colloidally-soluble moisturising agents such as hylaronic acid and starch-grafted sodium polyacrylates such as Sanwet (RTM) IM-1000, IM-1500 and IM-2500 available from Celanese Superabsorbent Materials, Portsmith, VA, USA and described in USA-A-4,076,663; vitamins such as vitamin A, vitamin C, vitamin E and derivatives thereof and building blocks thereof such as phytantriol and vitamin K and components thereof such as the fatty alcohol dodecatrienol; alpha and beta hydroxyacids; aloe vera; sphingosines and phytosphingosines, cholesterol; skin whitening agents; N-acetyl cysteine; colouring agents; antibacterial agents such as TCC/TCS, also known as triclosan and trichlorocarbon; perfumes and perfume solubilizers. Examples of alpha hydroxy acids include glycolic acid, lactic acid, malic acid, citric acid, glycolic acid in conjunction with ammonium glycolate, alpha-hydroxy ethanoic acid, alpha-hydroxyoctanoic acid, alpha-hydroxycaprylic acid, hydroxycaprylic acid, mixed fruit acid, tri-alp0ha hydroxy fruit acids, triple fruit acid, sugar cane extract, alpha hydroxy and botanical comprise, l-alpha hydroxy acid and glycomer in crosslinked fatty acids alpha nutrium. Preferred examples of alpha hydroxy acids are glycolic acid and lactic acid. It is preferred that alpha hydroxy acids are used in levels of upto 10%.

The compositions of the present invention can additionally comprise from about 0.1% to about 5% by weight of aluminium starch octenylsuccinate. Aluminium starch octenylsuccinate is the aluminium salt of the reaction product of octenylsuccinic anhydride with starch and is commercially available under the trade name from Dry Flo National Starch & Chemical Ltd. Dry Flo is useful herein from the viewpoint of skin feel and application characteristics.

A safe and effective amount of an anti-inflammatory agent may be added to the compositions of the subject invention, preferably from about 0.1% to about 5%, more preferably from about 0.1% to about 2%, of the composition. The anti-inflammatory agent enhances the skin appearance benefits of the present invention, e.g., such agents

contribute to a more uniform and acceptable skin tone or colour. The exact amount of anti-inflammatory agent to be used in the compositions will depend on the particular anti-inflammatory agent utilised since such agents vary widely in potency.

Compositions of the subject invention can further include an anti-oxidant/radical scavenger. The anti-oxidant/radical scavenger is especially useful for providing protection against UV radiation which can cause increased scaling or texture changes in the stratum corneum and against other environmental agents which can cause skin damage. Suitable amounts are from about 0.1% to about 10%, more preferably from about 1% to about 5%, of the composition. Anti-oxidants/radical scavengers such as ascorbic acid (vitamin C) and its salts.

The inclusion of a chelating agent is especially useful for providing protection against UV radiation which can contribute to excessive scaling or skin texture changes and against other environmental agents which can cause skin damage. A suitable amount is from about 0.01% to about 1%, more preferably from about 0.05% to about 0.5%, of the composition. Exemplary chelators that are useful herein are disclosed in U.S. Patent No. 5,487,884, incorporated herein by reference. Preferred chelators useful in compositions of the subject invention are ethylenediamine tetraacetic acid (EDTA), furildioxime, and derivatives thereof.

The compositions of the present invention can also comprise a skin lightening agent. When used, the compositions preferably comprise from about 0.1% to about 10%, more preferably from about 0.2% to about 5%, also preferably from about 0.5% to about 2%, of a skin lightening agent. Suitable skin lightening agents include those known in the art, including kojic acid, arbutin, ascorbic acid and derivatives thereof, e.g., magnesium ascorbyl phosphate. Further skin lightening agents suitable for use herein also include those described in WO 95/34280 and WO 95/23780; each incorporated herein by reference.

Other optional materials include water-soluble or solubilizable preservatives preferably at a level of from about 0.1% to about 5%, such as Germall 115, methyl, ethyl, propyl and butyl esters of hydroxybenzoic acid, benzyl alcohol, DMDM hydantoin iodopropanyl

butylcarbanate available under the trade name Glydant Plus from Lonza, EDTA, Euxyl (RTM) K400, Bromopol (2-bromo-2-nitropropane-1,3-diol) and phenoxypropanol; anti-bacterials such as Irgasan (RTM) and phenoxyethanol (preferably at levels of from 0.1% to about 5%). Antibacterial agents such as TCC/TCS, also known as triclosan and trichlorocarbon are also useful in compositions of the present invention.

Other optional materials herein include pigments which, where water-insoluble, contribute to and are included in the total level of oil phase ingredients. Pigments suitable for use in the compositions of the present invention can be organic and/or inorganic. Also included within the term pigment are materials having a low colour or lustre such as matte finishing agents, and also light scattering agents. Preferably the compositions of the present invention comprise particulate materials having a refractive index of from about 1.3 to about 1.7, the particulate materials being dispersed in the composition and having a median particle size of from about 2 to about 30 μm. Preferably the particulates useful herein have relatively narrow distributions, by which is meant that more than 50% of the particles fall within 3 μm either side of the respective median value. Also preferred is that more than 50%, preferably more than 60%, more preferably more than 70% of particles fall within the size ranges prescribed for the respective median values. Suitable particulate materials are organic or organosilicone and preferably organosilicone polymers. Preferred particles are free-flowing, solid, materials. By "solid" is meant that the particles are not hollow. The void at the centre of hollow particles can have an adverse effect on refractive index and therefore the visual effects of the particles on either skin or the composition. Suitable organic particulate materials include those made of polymethylsilsesquioxane, referenced above, polyamide, polythene, polyacrylonitrile, polyacrylic acid, polymethacrylic acid, polystyrene, polytetrafluoroethylene (PTFE) and poly(vinylidene chloride). Copolymers derived from monomers of the aforementioned materials can also be used. Inorganic materials include silica and boron nitride. Representative commercially available examples of useful particulate materials herein are Tospearl® 145 which has a median particle size of about 4.5 μm and EA-209® from Kobo which is an ethylene / acrylic acid copolymer having a median particle size of about

10 μm, Nylon-12 available under the trade name Orgasol 2002 from Elf Atochem, France, or mixtures thereof.

Further examples of suitable pigments are titanium dioxide, predispersed titanium dioxide from Kobo e.g. Kobo GWL75CAP, iron oxides, acyglutamate iron oxides, ultramarine blue, D&C dyes, carmine, and mixtures thereof. Depending upon the type of composition, a mixture of pigments will normally be used. The preferred pigments for use herein from the viewpoint of moisturisation, skin feel, skin appearance and emulsion compatibility are treated pigments. The pigments can be treated with compounds such as amino acids, silicones, lecithin and ester oils.

Suitably, the pH of the compositions herein is in the range from about 6.1 to about 10.0, preferably from about 7.0 to about 9.0, more preferably from about 8.0 to about 9.0 and even more preferably from about 8.0 to about 8.6. It is preferred that the pH of the final composition is adjusted by addition of acidic, basic or buffer salts as necessary.

The cosmetic compositions herein preferably have a water activity greater than 0.85, more preferably greater than 0.9, and most preferably greater than 0.95.

The compositions of the invention are generally in emulsion form and are preferably formulated so as to have a product viscosity of at least about 4,000 mPa.s and preferably in the range from about 4,000 to about 1,000,000 mPa.s, more preferably from about 8,000 to about 350,000 mPa.s and especially from about 10,000 to about 250,000 mPa.s and even more especially from about 10,000 to about 150,000 mPa.s (25°C, neat, Brookfield RVT, T Spindle at 5 rpms and Heliopath Stand).

Preparation of Compositions

The compositions of the present invention are prepared by standard techniques well known to those skilled in the art. In general the aqueous phase and/ or the oil phase would be prepared separately, with materials of similar phase partitioning being added in any order. If the final product is an emulsion, the two phases will then be combined with vigorous stirring. Any ingredients in the formulation with high volatility, or which are

susceptible to hydrolysis at high temperatures, can be added with gentle stirring towards the end of the process, post emulsification if applicable.

Examples

The following examples further illustrate the preferred embodiments within the scope of the present invention. These examples are given solely for the purpose of illustration and are not to be construed as limitations of the present invention as many variations of the invention are possible without departing from its spirit or scope. Unless otherwise indicated, all ingredients are expressed as a weight percentage of the active ingredient.

Enzyme Compositions

	Example 1	Example 2	Example 3
	%w/w	%w/w	%w/w
Protease enzyme [1]	100ppm	200ppm	1000ppm
Standard Buffer solution*	qs	qs	qs
Total	**100**	**100**	**100**

* pH adjusted to desired value using standard buffer solution, outlined in text books, eg Handbook of Chemistry and Physics

Polyhydric Alcohol Compositions

	Example 4	Example 5	Example 6	Example 7	Example 8
	%w/w	%w/w	%w/w	%w/w	%w/w
DEIONISED WATER	qs	qs	qs	qs	qs
GLYCERIN	7.00	10.00	12.00	10.00	12.00
Niacinamide	0.00	0.00	0.00	3.50	5.00
Panthenol	0.00	0.00	0.00	0.50	0.50
Vitamin E Acetate	0.00	0.00	0.00	0.50	0.50
ISOHEXADECANE	2.94	3.08	3.12	5.40	5.40
POLYACRYLAMIDE & C13-14 ISOPARAFFIN & LAURETH-7[2]	2.50	2.50	2.50	2.50	2.50
DIMETHICONE & DIMETHICONOL[3]	2.00	2.00	2.00	2.00	2.00

ISOPROPYL ISOSTEARATE	1.33	1.33	1.33	2.40	2.40
SORBITAN STEARATE & SUCROSE COCOATE[4]	1.00	1.00	1.00	1.00	1.00
CETYL ALCOHOL	0.71	0.74	0.75	0.50	0.50
PETROLATUM	0.00	3.00	0.00	5.00	0.00
Isopropyl Palmitate	0.50	0.50	0.50	0.00	0.00
Behenyl Alcohol	0.00	0.00	0.00	0.72	0.72
SEFA COTTONATE	0.66	0.69	0.70	1.20	1.20
STEARYL ALCOHOL	0.47	0.49	0.50	0.72	0.72
BENZYL ALCOHOL	0.25	0.25	0.25	0.25	0.25
ETHYLPARABEN	0.20	0.20	0.20	0.20	0.20
PROPYLPARABEN	0.10	0.10	0.10	0.10	0.10
DISODIUM EDTA	0.10	0.10	0.10	0.10	0.10
POLYOXYETHYLENE-100 STEARATE[4]	0.10	0.10	0.10	0.10	0.10
STEARIC ACID	0.10	0.10	0.10	0.10	0.10
SODIUM HYDROXIDE	0.04	0.05	0.05	0.05	0.05
	100	100	100	100	100

1. Genencor International, Palo Alto, California, US

2. Supplied by Seppic, 75 Quai D'Orsay, Paris

3. Supplied by Dow Corning, Kings Court, 185 Kinds Rd, Reading, Berks, RG1 4EX

4. Supplied ICI, PO Box 90, Wilton Centre, Middlesborough, Cleveland, England. TS6 8JE

Compositions were prepared based on the formulations described above. Study participants were treated with 0.1-2 micrograms of enzyme solutions (examples 1-3) per square cm followed by 0.8-2 micrograms of polyhydric alcohol composition (examples 4-8) over a total skin area of 35 square cm. Skin hydrations levels were then measured over time using a corneometer.

The cosmetic methods used in the above examples display excellent skin hydration, skin softness and skin smoothness benefits.

CLAIMS:

1. Cosmetic method for providing improved skin hydration comprising topically applying to the skin a protease enzyme, and, simultaneously or sequentially, topically applying to the skin a polyhydric alcohol.
2. Cosmetic method for providing improved skin hydration comprising topically applying to the skin a polyhydric alcohol, and simultaneously or sequentially, topically applying to the skin a protease enzyme.
3. Cosmetic method for providing improved skin hydration comprising topically applying to the skin a cosmetic composition wherein the composition comprises:
   (a) from about 0.0001% to about 1%, by weight, of a protease enzyme; and
   (b) from about 0.1% to about 20%, by weight, of polyhydric alcohol.
4. Cosmetic method for providing improved skin hydration comprising topically applying to the skin a first cosmetic composition comprising from about 0.0001% to about 1%, by weight, of a protease enzyme, and, simultaneously or sequentially, topically applying to the skin a second cosmetic composition comprising from about 0.1% to about 20%, by weight, of a polyhydric alcohol.
5. Cosmetic method according to any of Claims 1 to 4 wherein the enzyme is selected from subtilisin, chymotrypsin and elastase-type protease enzymes.
6. Cosmetic method according to any of Claims 1 to 5 wherein the enzyme is selected from bacterial serine protease enzyme, and variants thereof, obtained from *Bacillus amyloliquefaciens, Bacillus licheniformis* and/or *Bacillus subtilis*, including Alcalase®, Esperase®, Savinase®, Maxatase®, Maxacal® and Maxapem 15® (protein engineered Maxacal®), and subtilisin BPN and BPN'.
7. Cosmetic method according to any of Claims 1 to 6 wherein the enzyme is selected from Alcalase®, BPN', Protease A, Protease B, Protease D, and Protease F, and mixtures thereof, preferably Protease F.
8. Cosmetic method according to Claim 3 or 4 wherein the cosmetic composition comprises from about 0.001% to about 0.5% and most preferably from about 0.005% to about 0.1%, by weight, of protease enzyme.

9. Cosmetic method according to Claim 3 or 4 wherein the cosmetic composition comprises from about 0.5% to about 18%, preferably from about 2% to about 15% and more preferably from about 5% to about 12%, by weight, of polyhydric alcohol.

10. Cosmetic method according to Claim 3 or 4 wherein the polyhydric alcohol is selected from glycerine; butylene glycol; propylene glycol; dipropylene glycol; polyethylene glycol; hexane triol; ethoxylated glycerine; propoxylated glycerine and mixtures thereof.

11. Cosmetic method according to Claim 10 wherein wherein the polyhydric alcohol is selected from glycerine, butylene glycol, propylene glycol, polyethylene glycol and mixtures thereof.

12. Cosmetic method according to any of Claims 1 to 11 wherein the method additionally comprises applying to the skin a skin care active selected from a vitamin B_3 component, panthenol and vitamin E acetate.

13. Cosmetic method according to Claim 12 wherein the skin care active is a vitamin B_3 component.

14. Cosmetic method according to Claim 12 or 13 wherein the skin care active is a vitamin B_3 complex comprising niacinamide, panthenol and a retinol compound.

INTERNATIONAL SEARCH REPORT

tional Application No
.../US 00/25084

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K7/48 A61K7/06 C11D1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61K C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 968 707 A (BEIERSDORF AG) 5 January 2000 (2000-01-05) examples 3,4 ---	1-14
A	US 4 508 707 A (AYUKAWA TAIZO) 2 April 1985 (1985-04-02) example 4 ---	1-14
A	WO 97 27841 A (GIST BROCADES BV ;EDENS LUPPO (NL); TAN HONG SHENG (NL); LAMBERS J) 7 August 1997 (1997-08-07) the whole document ---	1-14
A	US 6 117 433 A (EDENS LUPPO ET AL) 12 September 2000 (2000-09-12) the whole document --- -/--	1-14

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 July 2001	24/07/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Couckuyt, P

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

ational Application No
. . ./US 00/25084

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 755 673 A (OREAL) 29 January 1997 (1997-01-29) page 5, line 3; example 6	1-14
A	EP 0 839 520 A (OREAL) 6 May 1998 (1998-05-06) claims 1,19	1-14
A	US 5 932 234 A (AFRIAT ISABELLE ET AL) 3 August 1999 (1999-08-03) the whole document	1-14
A	US 5 866 158 A (HANDJANI ROSE-MARIE ET AL) 2 February 1999 (1999-02-02) examples 9,21	1-14
A	FR 2 780 645 A (OREAL) 7 January 2000 (2000-01-07) examples	1-14
A	DE 198 34 818 A (MERCK PATENT GMBH) 3 February 2000 (2000-02-03) claims	1-14

INTERNATIONAL SEARCH REPORT

itional Application No
.../US 00/25084

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0968707 A	05-01-2000	DE 19829789 A	05-01-2000
US 4508707 A	02-04-1985	JP 58079913 A	13-05-1983
		CA 1187416 A	21-05-1985
		EP 0079074 A	18-05-1983
WO 9727841 A	07-08-1997	AU 1721697 A	22-08-1997
		BR 9702049 A	13-01-1998
		CA 2216169 A	07-08-1997
		EP 0817613 A	14-01-1998
		JP 11503465 T	26-03-1999
		US 6117433 A	12-09-2000
US 6117433 A	12-09-2000	AU 1721697 A	22-08-1997
		BR 9702049 A	13-01-1998
		CA 2216169 A	07-08-1997
		WO 9727841 A	07-08-1997
		EP 0817613 A	14-01-1998
		JP 11503465 T	26-03-1999
EP 0755673 A	29-01-1997	FR 2737116 A	31-01-1997
		BR 9604009 A	22-04-1998
		DE 69601755 D	22-04-1999
		DE 69601755 T	15-07-1999
		ES 2133907 T	16-09-1999
		JP 3023074 B	21-03-2000
		JP 9040543 A	10-02-1997
		US 5703041 A	30-12-1997
EP 0839520 A	06-05-1998	FR 2755366 A	07-05-1998
		FR 2755368 A	07-05-1998
		DE 69700092 D	18-02-1999
		DE 69700092 T	27-05-1999
		ES 2129276 T	01-06-1999
		JP 3001845 B	24-01-2000
		JP 10139621 A	26-05-1998
		US 5932234 A	03-08-1999
US 5932234 A	03-08-1999	FR 2755366 A	07-05-1998
		FR 2755368 A	07-05-1998
		DE 69700092 D	18-02-1999
		DE 69700092 T	27-05-1999
		EP 0839520 A	06-05-1998
		ES 2129276 T	01-06-1999
		JP 3001845 B	24-01-2000
		JP 10139621 A	26-05-1998
US 5866158 A	02-02-1999	FR 2694893 A	25-02-1994
		FR 2694884 A	25-02-1994
		AT 145544 T	15-12-1996
		AU 4434193 A	10-02-1994
		CA 2101760 A	04-02-1994
		DE 69306190 D	09-01-1997
		DE 69306190 T	03-04-1997
		DK 582503 T	24-02-1997
		EP 0582503 A	09-02-1994
		ES 2095015 T	01-02-1997
		GR 3022513 T	31-05-1997

INTERNATIONAL SEARCH REPORT

tional Application No
.../US 00/25084

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5866158 A		JP 2772751 B	09-07-1998
		JP 6184002 A	05-07-1994
		US 5741518 A	21-04-1998
		ZA 9305568 A	01-03-1994
FR 2780645 A	07-01-2000	EP 0970691 A	12-01-2000
		JP 2000026275 A	25-01-2000
		US 6153205 A	28-11-2000
DE 19834818 A	03-02-2000	AU 5163199 A	28-02-2000
		WO 0007559 A	17-02-2000
		EP 1100453 A	23-05-2001

Form PCT/ISA/210 (patent family annex) (July 1992)